

REMARKS

By this amendment, applicants have amended the specification, abstract and claim 1 to change "P2" to read --T2-- to correct a typographical error. Applicants have also amended claims 1 and 2 to clarify that the hydrates are hydrocarbon gas hydrates as would be understood since the second thermogram is performed under a pressure of a hydrocarbon gas.

In view of the foregoing amendment to the abstract, reconsideration and withdrawal of the objection to the abstract in numbered section 1 of the office action are requested.

In view of the foregoing amendments to the claims, it is submitted all of the claims now in the application comply with the requirements of 35 USC 112, second paragraph. Therefore, reconsideration and withdrawal of the rejection of claims 1 - 7 under 35 USC 112, second paragraph, are requested.

Claims 1 - 7 stand rejected under 35 USC 103 as being unpatentable over United States Patent No. 5,660,603 to Elliot et al in view of the Hardware Manual from Rheometric Scientific entitled "Differential Scanning Calorimeter DSC" and further in view of United States Patent No. 6,417,415 to Sakaguchi et al. Applicants traverse this rejection and request reconsideration thereof.

The present invention relates to a method for determining gas-hydrate formation conditions in a well fluid, and to a system for implementing the method. The method includes taking a fluid sample, placing the sample in a calorimetry cell, performing a reference thermogram on the sample in a temperature range between T1 and T2, and then performing a second thermogram on the same sample. The second thermogram

is performed in the same range and under a pressure P_h of a hydrocarbon gas, T_1 being a temperature low enough to obtain the formation of hydrocarbon gas hydrates in the sample at a gas pressure P_h and T_2 being high enough to obtain hydrate dissociation. The method includes identifying a peak in the second thermogram corresponding to the hydrocarbon gas hydrates dissociation zone and deducing therefrom a hydrocarbon gas hydrates dissociation temperature. The hydrocarbon gas hydrate formation conditions are then determined for the fluid considered. Such is neither disclosed nor suggested by any of the applied references.

The Elliot et al patent discloses a process for separating selected component from multicomponent natural gas streams. This patent discloses that the catastrophic point, i.e., the point at which solid hydrate formation begins, is a function of temperature, pressure and gas composition. However, as admitted by the Examiner, the Elliot et al patent does not suggest measuring hydrate dissociation. Thus, the Elliot et al patent does not disclose a method for determining gas hydrate formation conditions in a well fluid. The patent does not disclose placing a fluid sample in a calorimetry cell. The patent does not disclose performing a reference thermogram on the sample. The patent does not disclose performing a second thermogram on the sample in a temperature range between T_1 and T_2 under a pressure P_h of a hydrocarbon gas, T_1 being a temperature low enough to obtain the formation of hydrocarbon gas hydrates in the sample at a gas pressure P_h , and T_2 being high enough to obtain hydrate disassociation. The patent does not disclose identifying a peak in the second thermogram corresponding to the hydrocarbon gas hydrates dissociation zone and deducing therefrom a hydrocarbon gas hydrates dissociation temperature. The patent

does not disclose determining hydrocarbon gas hydrate formation conditions for the fluid considered. Thus, the Elliot et al patent is generally irrelevant to the presently claimed invention.

The Rheometric Scientific Hardware Manual is merely a hardware manual for a differential scanning calorimeter. However, this manual does not even remotely suggest using the calorimeter for performing thermograms on a fluid sample in order to determine hydrocarbon gas hydrate formation conditions.

There is no suggestion in either Elliot et al or the Rheometric Scientific Manual that a differential scanning calorimeter should be used to determine a hydrocarbon gas hydrate dissociation temperature and/or hydrocarbon gas hydrate formation conditions for a well fluid.

The Sakaguchi et al patent does not remedy any of the deficiencies of Elliot et al and the Rheometric Hardware Manual. The Sakaguchi et al patent merely discloses methods of solidifying a low boiling point hydrocarbon, a method of handling the same, and a method of regenerating the same. While this patent includes Figure 1 which is a graph showing the result of differential scanning calorimetry of the white waxy solid aggregate substance of Example 1 of the patent, there is absolutely no suggestion that differential scanning calorimetry can be used for determining gas hydrate formation conditions in a well fluid.

Thus, none of the applied documents remotely suggests performing thermograms on a well fluid sample in a calorimetry cell to determine hydrocarbon gas hydrate formation conditions of the fluid considered. As noted in In re Lee, 277 F.3d 1338, 61 USPQ 2d 1430 (Fed. Cir. 2002):

When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness ...[T]he Examiner can satisfy the burden of showing obviousness of the combination "only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references"....

The Examiner has not shown any objective teaching in the prior art or any knowledge generally available to one of ordinary skill in the art that would have led one of ordinary skill in the art to have performed a reference thermogram and a second thermogram in a calorimetry cell in a temperature range between T_1 and T_2 , the second thermogram being performed under a pressure P_h of a hydrocarbon gas, identifying a peak in the second thermogram corresponding to the hydrocarbon gas hydrates disassociation zone and deducing therefrom a hydrocarbon gas hydrates dissociation temperature in order to determine the hydrocarbon gas hydrate formation conditions for the fluid considered.

It is important to understand that a well fluid supports variation and evolution of pressure during its travel along the well. Therefore, it is very interesting to obtain the risk of hydrate production in view of the conditions of the drilling fluid. The present invention can be used to determine gas hydrate formation conditions in a well fluid, i.e., by using a pressure P_h determined as a function of the pressure of the well fluid close to the zones where the appearance of hydrocarbon gas hydrates is critical. See, dependent claim 2. This additional feature is neither disclosed nor suggested by the proposed combination of references.

For the foregoing reasons, the presently claimed invention is patentable over the proposed combination of Elliot et al, the Rheometric Scientific Hardware Manual and

Sakaguchi et al.

Applicant notes the Examiner has cited a number of documents pertinent to applicants' disclosure. However, since these documents were not applied in rejecting claims formerly in the application, further discussion of these documents is deemed unnecessary.

In view of the foregoing amendments and remarks, favorable reconsideration and allowance of all of the claims now in the application are requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 612.41120X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

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